ORIGINAL 39

From: Jerry Smith
To: DGI Interested Parties
Date: 6/30/00 5:23PM
Subject: DGI Workgroup Final Report

As a party interested in the ACC's investigation of Distributed Generation and Interconnections you will find the following seven attached items:

1. DGI Workgroup Final Report submitted by the Advisory Committee and dated June 28,2000.
2. February 28, 2000 Advisory Committee meeting minutes.
3. Comments received from APS, TEP City of Tucson and Honeywell regarding draft of Final report.
4. Report to NARUC regarding DGI barriers prepared by Honeywell and submitted with its comments in item 3.

These items will be filed in ACC Docket Control per:
Docket No. E-00000A-99-0431
General investigation of Distributed Generation and Interconnections for potential retail electric competition rules consideration.

With the distribution of these documents the DGI investigation process is considered complete. Within the next few weeks ACC Staff will establish the process that will eventually lead to an ACC rulemaking effort. We are considering emergency procedures or emergency rules as a short term approach but intend to proceed with formal rulemaking in calender year 2001.

I personally thank each and every participant in the DGI investigation for your individual contribution over the past year. I look forward to working with you as we take the next step of our journey towards accommodating DG as a retail consumer choice.

Sincerely,
Jerry D. Smith
Chairman, DGI Investigation

Arizona
Corporation
Commission

Distributed Generation and Interconnections Investigation

Docket No. E-00000A-99-0431

DGI Workgroup Final Report

Prepared and Submitted by the

DGI Advisory Committee

June 28, 2000

Acknowledgements

This document is the culmination of an Arizona Corporation Commission (ACC) investigation of Distributed Generation and Interconnections (DGI) under Docket No. E-00000A-99-0431. The investigation began with a DGI Workshop on June 28, 1999. The numerous issues and concerns identified at the workshop were then investigated utilizing a formal workgroup process. Three DGI Workgroup committees were formed to consider the DGI Workshop concerns and issues. The three committees completed their assigned tasks with individual committee reports dated November 22 and 30, 1999. A DGI Advisory Committee was then formed to complete the workgroup process by producing this report. This report documents the entire DGI investigation process. It also consolidates and contrasts key results of the three DGI Workgroup committees' efforts into one document. The members of the DGI Advisory Committee are as follows:

DGI Advisory Committee Members

Steve Bischoff
Arizona Public Service

Linda Buczynski
City of Tucson

Chuck DeCorse
Tucson Electric Power

Dave Drummond
Distributed Power Coalition of America

Dan Goodrich
Salt River Project

Chuck Miessner
New Energy, Inc.

Jeff Jacobson
SW Gas

Bill Murphy
City of Phoenix

Brian O'Donnell
Distributed Energy Association of Arizona

Matt Puffer
Engine World

Steve Schmollinger
Tucson Electric Power

Dave Townley
NEV Technologies

The stakeholder participation in the entire investigation has been extensive and diverse. Many individuals, representing many different firms and interests, have endured the many hours of meetings to discuss and document the issues and concerns while working towards a consensus or agreeing to disagree in a cordial manner. However, it is the members of the DGI Advisory Committee that has assumed the greatest burden. They have been asked to produce a report documenting results of the investigative process independent of their own views or their firm's position on issues.

Therefore, I take this opportunity to record my deepest appreciation to each of the DGI Advisory Committee members for their candor, persistence and dedicated commitment to purpose. Their efforts have produced a document that will serve as an excellent resource for the ACC Staff as it commences to draft new rules to ensure distributed generation is a choice available to retail consumers. Congratulations and thank you for a job well done!

Jerry D. Smith
ACC Staff
Chairman of DGI Investigation

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Section 1: Executive Summary

On June 28, 1999 the Arizona Corporation Commission (ACC) sponsored a workshop on distributed generation and interconnections. In general terms, distributed generation (DG) is small-scale power generation units strategically located near consumers and load centers. DG has the potential to provide benefits to customers and support the economic operation of the power distribution grid. It has recently received significant interest both nationally and in Arizona. Technological improvements are making DG an option for a broader range of retail consumers including commercial, industrial, and residential customers.

Furthermore, DG goes hand in hand with the ongoing effort to restructure the electric energy markets in Arizona. Competition brings the benefits of new technologies, enhanced information about energy use, and greater options for customers. Once regulatory, interconnection, economic, and safety considerations are addressed, distributed generation may become a vital part of this increased choice. Competition also necessitates an expanded outlook for utility planning and operations. As vertically integrated utilities divest of generation assets and transform into utility distribution companies, an increased level of flexibility (and perhaps complexity) will be required in their management processes.

1.1 Authorization of Investigation

In July 1999, the Arizona Corporation Commission initiated a "General investigation of Distributed Generation and Interconnections (DGI) for potential retail electric competition rules consideration" under Docket No. E-00000A-99-0431. This report documents the results of that investigation. It includes the identification of key stakeholder issues and recommendations for developing standards, policies and tariffs for distributed generation through the rulemaking process.

1.2 Purpose of Investigation

The purpose of the DGI investigation was to address issues raised at the June 28, 1999 DGI Workshop and related issues arising during consideration of the DGI topic. In addition, the investigation was to develop a framework for accommodating DG applications as a retail consumer choice in Arizona.

1.3 Framework of Investigation

The DGI investigation was accomplished by formation of a workgroup of all interested parties. This larger group was referred to as the DGI Workgroup. Three committees were then formed within the DGI Workgroup for the purpose of undertaking certain aspects of the investigation. The three committees were:

1. Siting, Certification and Permitting (SCP)
2. Access, Metering, and Dispatch (AMD)
3. Interconnection Standards (IS)

Each issue identified in the June 28, 1999 DGI Workshop was assigned to one of the three DGI Workgroup committees with an associated number of the following work scope objectives:

- Identify siting, certification and environmental permitting issues.
- Develop a standardized application process for DG projects.
- Assess the potential impacts of DG on the planning and operation of the utility distribution grid and recommend necessary changes to utility planning and operations.
- Explore tariff, pricing, contract, and other business arrangements needed to facilitate the installation of DG.
- Recommend interconnection standards necessary to streamline the implementation of DG, while maintaining safety standards.

The three DGI Workgroup committees researched and debated assigned issues while considering various stakeholder views. Each committee effectively completed its assigned work scope and published a final report. Conclusions and recommendations provided in each committee report document the consensus achieved solely within each respective committee.

A DGI Advisory Committee was formed for the purpose of reviewing the three DGI Workgroup committee reports and associated docketed comments and reference material. This committee was also charged with the responsibility of extracting key investigation results from the three committee reports and then consolidating and contrasting those key results in this DGI Workgroup final report.

1.4 Key Findings and Recommendations for Rulemaking

An Advisory Committee review of the three DGI Workgroup committee reports, associated reference material and docketed comments reveals that a committee consensus was achieved for some issues and in other instances a difference of opinion remained among committee participants or between workgroup committees. Nevertheless, the Advisory Committee identified several key issues that emerged from the workgroup process. For several of the issues, the DGI Advisory Committee recommends that workshops be held to acquire additional information. The Advisory Committee recommends that the ACC rulemaking process:

1. Design fair and reasonable tariffs considering proper recovery of utility costs, backup power or partial-requirements tariffs, and PURPA Qualifying Facilities (QF) tariffs while providing consistent treatment of DG relative to other consumer services. The Advisory Committee recommends a workshop to be held on these issues concurrent with rulemaking.[1]
2. Consider the benefits and costs of DG to the utility distribution grid.[2]
3. Address operational issues, such as the scheduling and accounting of DG energy transactions, the control of DG by a control area operator, and operational protocols for system disturbances. The Advisory Committee believes that workshops may be needed following ACC rulemaking efforts to address issues that arise during implementation of DG.[3]
4. Address certain technical issues and processes necessary to interconnect DG to the grid.[4]
5. Define DG and related terminology consistent with ACC Electric Competition Rules and FERC.[5]

[1] Section 3.1.1
[2] Section 3.1.2
[3] Section 3.1.3
[4] Sections 3.2.1 and 3.2.2
[5] Section 3.2.3

6. Define planning processes needed for DG operating in parallel with the distribution grid, and consider appropriateness of public access to distribution system operational information.[6]
7. Address DG applications on network distribution systems. Due to the complex and technical nature of this issue, the Advisory Committee recommends that a workshop be held on this topic.[7]
8. Establish a periodic review process for monitoring the progress of implementing the policies and standards necessary for distributed generation.
9. Consider how to extend DGI rules to electric utilities not subject to ACC jurisdiction.

[6] Sections 3.2.4, 3.4.4 and 3.4.7
[7] Section 3.4.5

Section 2: Overview of Distributed Generation and Interconnections Investigation

At the close of the Arizona Corporation Commission (ACC) retail electric competition rulemaking process the Distributed Energy Association of Arizona (DEAA) requested that a workshop be held to investigate applications of Distributed Generation (DG). ACC Staff solicited suggestions for such a workshop and filed them under Docket No. E-00000A-99-0431. This docket was opened for the purpose of performing a "General investigation of Distributed Generation and Interconnections for potential retail electric competition rules consideration."

2.1 DGI Workshop

A Distributed Generation and Interconnections (DGI) Workshop was sponsored by the ACC on June 28, 1999. Sarah McKinley, Executive Director of Distributed Power Coalition of America, opened the DGI Workshop with a keynote address entitled "An Overview of State and Federal Initiatives for Distributed Generation." Then two diverse groups of panelists discussed relevant workshop topics. Jerry Smith, representing ACC Staff, served as moderator for both panels.

Panel A was comprised of panelists representing three stakeholder groups: the DG provider community, utility distribution companies, and consumers with actual distributed generation projects. This panel considered the status of DG technology, three actual DG projects in Arizona and the overall DG operational experience of Arizona utilities. The panel established a "state of the art" point of reference regarding DG and technical requirements for interconnecting with electric utility systems. Panel A participants are listed below.

Panel A: Local Experiences

Distributed Generation Providers	Actual Consumer Projects	Utility Distribution Companies
Keith Davidson Sr. Vice President Onsite Sycom Energy Corp.	Mike Busquaert Central Plant Mgr. Phoenician Resort	Phillip Asbury Planning /Design Supervisor SSVEC
David Townley VP – Business & Product Dev New Energy Technology	(SSVEC) Bonita Nursery	Steve Bischoff Director, Operations & Maintenance Arizona Public Service
Jeff Jacobson Manager, Large Customer Programs Southwest Gas	(TEP, SWGas) Bob's Auto Spa	Bob Hess Principal Engineer Salt River Project

Panel B was also comprised of panelists representing three stakeholder groups: the jurisdictional and regulatory community, retail market advocates, and restructured utility organizations. This panel considered standards and jurisdictional requirements affecting siting and interconnecting DG to the utility; the framework of retail electric competition in Arizona; and consumer issues unique to DG applications. Panel B participants are listed below.

Panel B: DG & Retail Competition

Jurisdictional & Regulatory Community	Retail Market Advocates	Restructured Utilities
Bill Murphy Dep. Director, Public Works City of Phoenix	Michael C. Burke Chairman NEV Technologies	Chuck DeCorse Technical Advisor Group Tucson Electric Power
Ron Franquero P.E., Utilities Division ACC	Mark Skowronski Manager, Power Marketing Honeywell	Bob Smith Manager, Power Operations Arizona Public Service
	Prem Bahl Chief Engineer RUCO	Laurel Whisler Executive Director Arizona ISA

The workshop concluded with a group exercise designed to identify concerns that may warrant regulatory consideration. Attendees split into two breakout groups to discuss and clarify issues relevant to the DGI investigation. One group addressed issues related to implementation of DG units and the other group addressed interconnections with the utility grid. A summary list of issues identified by this process is provided in Appendix A.

2.2 DGI Workgroup Process

The ACC sponsored a special open meeting on August 30, 1999 to form a DGI Workgroup. ACC Staff presented a workgroup organizational proposal including associated committees to investigate issues raised at the June 28th DGI Workshop. Those in attendance adopted the proposal without change. Therefore, the DGI Workgroup was organized into three committees:

- Siting, Certification and Permitting Committee (SCP)
- Market Access, Metering, and Dispatch Committee (AMD)
- Interconnection Standards Committee (IS)

By unanimous consent, tasks and DGI Workshop issues were assigned to each committee per the August 30th ACC Staff proposal. Each committee assumed a responsibility to complete its assigned work scope and submit a consensus committee report to the DGI Workgroup by December 1, 1999. The work scope assigned to each DGI Workgroup committee is outlined in subsections 2.2.1 through 2.2.3 of this report.

Attendance and participation in workgroup and committee activities was open to anyone desiring to participate. Those in attendance at the August 30th meeting were given the opportunity to select the committee that they wanted to serve on. ACC Staff requested committee participation

of some organizations and individuals to ensure adequate stakeholder representation while maintaining a manageable size group.

The DGI Workgroup met on three additional occasions. Each committee gave a status report at each of the workgroup meetings. The workgroup meetings were also used to facilitate the exchange of information among committees and introduce new ideas. For example, Scott Castelaz of Encorp gave a presentation entitled "The Business Case for the Virtual Power Plant," that discussed how new technology is being implemented in the utility industry to affect the deployment of DG. Mr. Castelaz advised that the US might benefit from looking at how Sweden, the United Kingdom and New Zealand have accommodated distributed resources. In addition, he suggested that the IEEE interconnection standards would have a weak influence in Arizona's process because their development is progressing too slowly. He cited numerous US system experiences that serve as examples of why DG is needed now to provide quick short-term solutions to system problems.

Each committee met between DGI Workgroup meetings as documented below. It was in those meetings that assigned issues were refined and discussed in detail and at length. In some cases committee consensus was achieved and in other instances a difference of opinion remains regarding specific issues. On other occasions, certain issues were identified but not adequately addressed. Each committee prepared and submitted a report documenting its efforts and conclusions.

List of Meeting Dates for DGI Workgroup and Committees

Month	SCP Committee	AMD Committee	IS Committee	Workgroup
August	30	30	30	30
September	16 and 29	20	7, 17 and 23	-
October	7, 19 and 25	12, 20 and 25	4, 13 and 18	4 and 25
November	4 and 16	4, 12, and 19	1, 8, 15, 18 and 29	22

2.2.1 Siting, Certification & Permitting Committee Work Scope

This committee was formed to consider the siting, certification and permitting of new DG projects. The primary focus of its investigation included but was not limited to the following:

1. Identify thresholds for which siting is a public issue regarding:
   - air quality, fuel supply, noise, and safety.
2. Establish how the above siting thresholds are affected by:
   - type of unit, unit size, location of project, intended operational uses (self-providing, emergency backup, sell excess to others, etc.) and residential vs. commercial applications.
3. Recommend circumstances warranting training, certification or licensing of personnel or pre-certification of distributed generation system packages.
4. Recommend a standardized application process and identify required information.
5. Recommend jurisdiction appropriate for each siting, certification and permitting issue.

2.2.2 Access, Metering & Dispatch Committee Work Scope

This committee was formed to consider market access, metering and dispatch control of DG projects proposing to operate in parallel with the existing electric system. The primary focus of this committee's investigation included but was not limited to the following:

1. Develop a framework for DG customers accessing the energy market for the purpose of
   - supplementing self-provided energy with purchases from ESPs; selling excess energy to others; and contributing to ancillary services requirements.
2. Identify a means of accurately scheduling and accounting for the above transactions so system constraints are not exceeded.
3. Determine conditions when control area operator needs dispatch control over customer's unit.
4. Develop an operating protocol to effectively manage system disturbances when DG is connected.
5. Identify technical requirements associated with the above functions.
6. Identify conditions where system benefits or stranded cost may warrant pricing consideration.
7. Develop tariff concepts that facilitate the above transactions in a consistent and equitable fashion.

2.2.3 Interconnection Standards Committee Work Scope

This committee was formed to consider standards for interconnecting DG projects to existing electric systems. The primary focus of this committee's investigation included but was not limited to the following:

1. Research and review existing and developing national, industry and regulatory interconnection standards.
2. Recommend interconnection standards that should be referenced and adopted by Arizona for interconnection of small, medium and large distributed generation units considering:
   - type of proposed generating unit; system voltage class of interconnection; parallel vs. islanded generator operation; and inverter vs. synchronous connection of units.
3. Identify conditions when site specific interconnection requirements should be considered.
4. Recommended interconnection standards should address the following:
   - safe construction, maintenance, and operational practices; power quality impacts; system reliability impacts; and coordinated management of and response to disturbances.

2.2.4 Formal Comment Period

The three DGI Workgroup committees published their final reports on November 22, 1999 and November 30, 1999. The three reports were filed with ACC Docket Control and distributed electronically to all interested parties participating in the DGI process. A review period was then provided for all interested parties to submit formal comments regarding the three reports and the DGI investigation process. Eleven parties submitted formal comments by the December 22, 1999 dateline. All written comments were also filed with ACC Docket Control. Section 4 of this report documents the nature of the comments filed.

2.3 DGI Advisory Committee

An action plan to form an Advisory Committee to complete the remaining DGI Workgroup tasks was proposed and adopted at the November 22, 1999 DGI Workgroup meeting. Jerry Smith of ACC Staff agreed to chair the committee. Committee membership consisted of the six DGI Workgroup committee chairmen, co-chairmen, and subcommittee chairmen and an equal number of at-large members. The DGI Workgroup Chairman selected at-large Advisory Committee members from those parties that formally submitted comments regarding the DGI Workgroup committee final reports and that declared an interest in participating. The Advisory Committee Chairman reserved the right to invite participation by someone not meeting the stated prerequisite when a stakeholder group would otherwise not be adequately represented. Committee meetings were open to anyone desiring to attend and participate.

The DGI Workgroup Advisory Committee was formed for the purpose of reviewing the three DGI Workgroup committee reports and associated docketed comments, evaluating and critiquing the DGI Workgroup process, and publishing a DGI Workgroup final report documenting the aforementioned tasks. This committee was also charged with the responsibility of recommending how endorsement might be obtained from stakeholders that have not participated in the DGI Workgroup process. The DGI Workgroup Advisory Committee completed its efforts during the months of January and February 2000.

The Advisory Committee met on the 10th, 24th and 31st of January 2000 and 7th, 22nd and 28th of February 2000 to perform its assigned tasks. Three or four committee members were assigned to each task. Each team of committee members drafted a portion of this report and submitted it to the committee for review, modification and adoption. By submittal of this final report the DGI Workgroup Advisory Committee has fulfilled its obligations. ACC Staff will use this final report and all of the docketed DGI Workgroup material as a reference when drafting proposed DGI rules. A review and comment period will likely precede Staff's filing of the proposed DGI rules with the ACC for rulemaking. The rulemaking process will likely span a period of three to four months.

2.4 Stakeholder Participation

ACC Staff designed the DGI investigation process to encourage and enable participation by any stakeholder that elected to do so. The process included but was not limited to the following features:

1. A docket number was opened for the DGI investigation process.
2. Agendas, notices, and minutes were prepared in accordance with open meeting laws.
3. All related correspondence and meeting materials were filed in Docket Control as a matter of public record.
4. Information was posted on the ACC website to inform interested parties not participating in the process.

Organizations participating in the DGI investigation are listed on the following page. A summary table is also provided on page 10 that documents the level of stakeholder participation experienced during the DGI investigation. Appendix B lists each individual participant and documents their involvement in the DGI Workshop, Workgroup and Committees.

Participating Organizations

Arizona Corporation Commission
Arizona Electric Power Cooperative
Agra Simons
Allied Signal / Honeywell
Arizona Public Service
APS Energy Services
Arizona Utilities Investors Association
AZ Independent Scheduling Administrator
Brown & Bain
Baltes Valentino & Associates
Capstone Turbine
City of Phoenix
City of Scottsdale
City of Tempe
City of Tucson
Cummins Southwest
Distributed Energy Association of AZ
Distributed Power Coalition of America
Diversified Technical SVCS
Empire Power Systems
Engine World
Energy Strategies Inc
ETA Engineering
Generac
Gen-Tech
Grand Canyon State Electric Cooperative
IBEW
Industrial Consultants Group
Maricopa County
ME Consultants
NewEnergy
On Site Sycom Energy
Phaser Advanced Metering Service
Phoenician Resort
Photovoltaic Resources
Robert s. Lynch
RPD Abbott Labs
RUCO
RW Beck
Sierra Southwest
Snell & Wilmer
Southwest Energy Solutions
Southwest Gas
SRP
Sulphur Springs Valley Electric Cooperative
Stewart & Stevenson
SW Wind Power
Touchstone Energy
Trico Electric Cooperative
TRW Vehicle Safety Systems
Tucson Electric Power

Participation Summary[8]
ACC Distributed Generation & Interconnections Investigation
Docket No. E-00000A-99-0431

Category	Committee Members	Number of Participants	Parties Represented	Number of Meetings	Participant Mtg Hours
Workshop	NA	72	31	1	432
Siting, Certification and Permitting Committee	13	28	17	8	228
Access, Metering and Dispatch Committee	20	33	20	8	222
Interconnection Standards Committee	15	22	17	12	212
Advisory Committee	13	28	17	6	542
Workgroup	NA	75	34	4	506
Formal Comments	NA	11	11	NA	NA
	Total	**123**	**56**	**39**	**2142**

[8] The participant hours reflected in this table do not reflect the amount of time each participant worked between formally scheduled meetings.

Section 3: Workgroup Process Assessment and Critique

Each of the three DGI Workgroup committees published a final committee report. These reports document conclusions and recommendations for which a consensus was achieved within each respective committee. In this section of report, the Advisory Committee documents issues the three committees failed to adequately address, did not address, or that remain without committee consensus. This section also documents where opinions differ among committees. The Advisory Committee thereby provides an assessment and critique of the whole DGI Workgroup process.

3.1 Assigned Committee Work Scope and Issues

This section addresses whether the three DGI Workgroup Committees adequately addressed the assigned work scope and issues and identifies what requires additional attention. The issues presented in Section 3.1 were assigned only to the AMD Committee and the references below are directed only to that committee's work.

3.1.1 Tariff Issues

In the AMD Committee Report tariff issues were discussed and a general consensus was conceptually reached on the following issues:

1. Under the new world of retail competition, the UDC would provide backup service for standard offer customers, through a bundled generation, transmission, and distribution tariff.[9]
2. Under the current ACC Competitive Rules, the UDC would not have an obligation or opportunity to provide backup generation service to direct access service. Some DG Providers felt that the Competitive Rules most likely did not fully contemplate the policies concerning DG. [10]
3. The economics of partial requirements tariffs (both existing and proposed) will need to be addressed to ensure that the rates appropriately recover the costs, including transmission and distribution (T&D) costs, associated with providing bundled partial requirements electric service to DG Customers.[11]
4. A partial-requirement direct access tariff is needed to properly recover T&D and any other relevant plant investment from customers using DG.[12]
5. Classic demand/energy rates vs. competition. The existing partial requirements tariffs were developed under the "bundled regime" of the past. These tariffs should be reviewed and revised, where appropriate, to ensure conformance with an "unbundled world."[13]

[9] AMD report page 14, Section A.1.
[10] AMD Report page 14, Section A.2.
[11] AMD report page 14, Section B.1.b.
[12] AMD Report page 15, Section B.2.d.
[13] AMD Report pg. 14, Section B.1.c.

While a conceptual consensus was reached on these issues, the AMD Committee did not have time (nor was it in their work scope) to address the application of these issues into specific tariffs.

There are divergent opinions on tariffs assessed for recovery of distribution costs and back up or parallel energy provision. This is involved in a discussion of standard offer and direct access tariffs as well as issues of fixed charge vs. commodity based recovery rates. The discussion includes issues such as:[14]

1. Unrecovered distribution costs
2. DG subsidization
3. Cost shifting
4. Flexibility of standard offer and direct access rates responding to DG
5. Shareholder return
6. Stranded cost recovery
7. Potential Settlement Agreement conflicts
8. Rate freeze impacts
9. Reduced price signals for energy efficiency
10. Create rate shocks or windfalls
11. Consistency with comparison to similar load reductions due to efficiency or business practice changes
12. Distribution wheeling charge as duplicative

Additionally, the following tariff related issues were not specifically addressed in the AMD Committee Report:

1. Disparity of treatment between customers with and without generation.
2. Standardized interconnect study fee schedules.
3. How will power factor be treated in rates and is a standard necessary statewide?
4. Tariff adjustment for UDC disconnect when it causes a peak (emergency & Maintenance).
5. Curtailable tariffs (DA Distribution Interruptible and Unbundled Delivery Partial Requirements Rates).
6. Disparity of treatment between regulated and non-regulated UDC's.

The Advisory Committee recommends that the ACC initiate a Tariffs and Rates Workshop to address both the application of the tariff issues addressed in the AMD Committee report and the above-mentioned issues that were not specifically addressed in this report. This workshop should occur simultaneously with the writing of draft DG rules by the ACC staff. The results of this workshop should be considered in the draft DG rules prior to these rules being Docketed (Docket No. E-00000A-99-0431).

3.1.2 Value and Cost Impacts of DG to the System

Although the value of DG was not a specific issue assigned to a committee, the AMD Committee did have a general discussion regarding potential benefits that DG could provide to the distribution grid.[15] Additionally, the following representations were outlined in a white paper

[14] AMD pgs. 18 – 23
[15] AMD pg. 13

submitted to the SCP Committee describing the following criteria for utilization in determining the viability and value of DG to a UDC:

1. Opportunities should be evaluated on a case-by-case-basis.
2. What investment would the DG allow the UDC to Defer?
3. Are there sites on the feeder to locate DG?
4. Does the UDC need to schedule or control the DG unit?
5. Can the UDC "count on" the DG to be available?
6. Will the UDC lose revenues when the DG in on-line that it is entitled to recover?
7. Does the DG customer receive a subsidy when the unit allows the UDC to defer T&D investment?

Concerns also exist regarding the following:

1. System impact costs associated with DG.
2. Who is responsible for paying any additional costs.
3. Who is responsible for proving system benefits.
4. Equitable access to interconnection with the grid.

The Advisory Committee recognizes that the criteria and methodology for identifying the value and cost impacts of DG to the System needs to be established and remands any decision on these issues to the ACC Staff for incorporation into the draft DG Rules. Consideration should be given to the above-mentioned criteria in determining the viability and value of DG to a UDC.

3.1.3 Operations Issues

The following operational issues were included in the work scope for the AMD Committee and were not specifically addressed in their report:

1. Identify a means of accurately scheduling and accounting for the above transactions (exports) so system constraints are not exceeded.
2. Determine conditions when the control area operator needs dispatch control over customer's DG unit.
3. Develop an operational protocol to effectively manage system disturbances in the presence of distributed generators.

In reference to issue 1 above, the AMD Committee specifically discussed the fact that the Scheduling Coordinator (SC) for the DG will schedule in accordance with NERC and WSCC guidelines. After the AZ Independent System Administration (AZ-ISA) protocols are adopted the SC will then schedule in accordance with the AZ-ISA Scheduling Protocol until an Independent System Operator (ISO) is in place. The SC will then schedule in accordance with the ISO protocols. However, this discussion was not included in the AMD Committee final report.

The Advisory Committee finds that an implementation workshop will likely need to be held after the rulemaking process to address several operational issues as operational protocols are recognized to have an effect on DG implementation.

3.2 Issues and Concerns Not addressed by Committees

This section identifies DGI related issues or concerns that were not included in the original work scope of the IS Committee, the AMD Committee or the SCP Committee. The Advisory Committee has discussed the issues and concerns documented in this section and recommends that they be remanded to the ACC staff for consideration in their writing of draft DG rules:

3.2.1 Technical Issues

1. ***Set points*** used to maximize DG benefits for system control and protective equipment.

   Set points for UDC and DG protective equipment could be optimized to allow DG to support the system frequency and voltage during system disturbances thereby aiding system reliability.

2. ***Grounding***. What is acceptable? Should there be a ground mat around working areas? What does NEC and IEEE Std. 80 say?

   The Interconnections Standards Committee discussed this issue and it was agreed that a review of the adequacy of existing standards for grounding is needed. However, the Interconnection Standards Committee did not have time to address this issue.

3. Any ***Technical Standards*** developed need a provision for review and revision.

   This is especially important because, like any code or regulation set in a changing technical or legislative landscape, adaptations have to be made for inevitable changes and developments, and furthermore to make additions and corrections for circumstances which could not have been foreseen until they have played themselves out.

3.2.2 Interconnection Process Issues

Dispute resolution and protocols: All parties are currently willing to attempt to work together on all aspects of DG interconnections. However, this issue may need to be re-addressed in the future. This is an issue that needs to be remanded to the ACC staff for draft rulemaking.

3.2.3 Policy Issues

Where ***Definitions*** exist in the ACC Electric Competition Rules they should be consistent with any definitions determined in any DG rulemaking. The DG rulemaking should include a definitive ruling on what constitutes DG that is consistent with FERC and other regulatory bodies.

3.2.4 Distribution Planning/Impacts Issues

With many current and emerging technologies, there needs to be contract standards regarding the reliability of the DG unit and its effect on the UDC's distribution system. The following planning issues have not been addressed in the original work scope of the three DG Committees.

1. Repercussions if DG suppliers decide to leave. Who must supply their customers and at what cost?
2. Increased uncertainty and increased risks to the UDC for these repercussions.
3. How long is it required to stay is service?

4. Provision of DG projected site location and capacity information to UDCs for planning purposes.

The Advisory Committee recommends that these issues be addressed during the workshop recommended in Section 3.1.1 to address Tariffs and Rates. In addition there may be operational concerns related to these planning issues. Therefore, these issues should also be addressed in the implementation workshop recommended by the Advisory Committee in Section 3.1.3.

3.3 Conflicting and Divergent Committee Issues

This section identifies areas where more than one committee dealt with a subject and differing views exist. Where possible, the differing views are identified as representing a committee consensus or in some circumstances the issues differed between stakeholders. These are issues that may require further study and work.

3.3.1 Categorizing Distributed Generation (DG) by Size

The AMD and IS Committees diverged on their proposed size categories for DG. The AMD Committee selected its size categories primarily considering project economics and grid impacts. The IS Committee chose size classifications based upon protective requirements and safety. Whereas, the AMD Committee outlined associated size issues in their report, the IS Committee simply provided a size breakdown in their Interconnection Requirements document.

The size categories presented by the two groups are based on a different set of criteria, each set important within it's own respect. The specifics of each approach are outlined in the respective committee reports. There does not appear to be any compelling reason to reconcile these differences regarding DG size categories provided the ACC rulemaking process addresses both committees' concerns.

The following table shows a comparison of the recommended generator size categories established by the two committees:

AMD Committee	IS Committee
0 – 300 kW	0 - 50 kW
301 kW –1,000 kW	51 kW – 300 kW
1,001 kW –10,000 kW	301 kW - 5,000 kW
Above 10,000 kW	Above 5,000 kW

3.3.2 DG Unit Size Impact on Operational Concerns

Both the AMD and IS Committees determined that the DG impact depends on several factors: unit size, the capacity of the distribution circuit, proximity to UDC generation source or substation, and whether the customer is served from a radial circuit, looped circuit, transfer switch, or spot network. The operating hours of the DG relative to daily and seasonal peak of the feeder also impacts the grid. Other factors to consider are basic DG technologies such as an inverter, synchronous generator, or induction generator.

In general, according to the AMD Committee, there is a lower level of concern for the 0-300 kW DG applications from a planning or operational perspective. The capacity for most distribution

circuits are in the 5 to 10 MW range, therefore, DG applications above 1 MW can be significant relative to size of the circuit.

The AMD and IS Committees discussed two possible rules of thumb to determine when DG would be considered significant relative to the capacity of a feeder and, therefore, would require increased information and design considerations by the affected UDC. Some UDCs did not favor the following rules of thumb because they do not take into account variables like seasonal loading, DG location relative to the load or the source (substation), and circuit switching. Also feeder protection requirements are minimal for smaller installations, but increase as the size of the customer's generation increases.

1. The size of a single DG unit should not exceed 50% of the feeder capacity. Aggregate DG capacity on the same feeder could go above this level before being considered prohibitive due to the diversity of the units.
2. Aggregate DG capacity would be considered significant if it could cause actual feeder loading to drop below the normal minimum load level for a feeder.

3.4 Areas Lacking Consensus

This section outlines topics discussed by multiple committees that failed to achieve a consensus within or among DGI Workgroup Committees or stakeholders. The following documentation of these topics cites references to the three Workgroup Committee reports when possible.

3.4.1 Obligation to Buy From DG

There was significant discussion regarding the obligation to buy from the DG Provider in all three committees. This concerned both QF facilities under PURPA and non-QF that are outside the context of PURPA laws. Formally, only the AMD Committee Final Report presented the question of whether there was or ought to be an obligation to purchase generation from DG Providers. It is generally agreed that this issue needs specific attention in the rulemaking process.

DG Providers agreed that the buyback of excess power from interconnected DG should not, in general, be made mandatory. However, this assumes effective competition is present such that an ESP or other provider can and will contract with DG owners/operators to purchase their excess power. Absent effective competition, the Arizona Corporation Commission (ACC) may need to review this provision. If the purchase of excess power from DGs is solely at the discretion/election of UDCs, the ACC should emphasize and monitor that the UDC fairly includes DG power when it competitively procures power for standard offer service.

In the AMD Committee discussions, there was agreement that PURPA is no longer the benchmark to use for either pricing power or buying it back, but that instead the "market" was the appropriate mechanism to use. It was the non-UDC representatives on the committee whose position was that PURPA was no longer relevant since we were looking at a DG related policy on a "go-forward" basis.

3.4.2 Application Process

Both the IS Committee and the SCP Committee addressed the issue of a DG application process. Both provide discussion and samples of applications and alternate process models in their respective reports. There is general agreement regarding the purpose and intent of applications. Disagreement exists primarily between the UDCs and DG Providers regarding response timeframes for applications. DG advocates state that the process with the UDC should be expeditious and time certain. UDCs have stated that they do not have an objection to some completion guideline, provided other relevant factors are taken in consideration.

The SCP committee report stated that 30 days should be adequate for a sufficiency review while allowing timeframe adjustments if all parties agreed to the delay.[16] This committee's conclusion was that for smaller unit installations the process should be shortened, especially if there have been previous installations that have gone through the process. Some committee members held the view that the process needed to be iterative and interactive.

The IS report[17] describes an iterative process with recommended timeframes. The IS process was specific regarding UDC responses to applications but also encouraged flexibility with the customer. Within the IS Committee there was some disagreement whether the timeframes could be met due to staffing considerations and an understanding that the process needs to be flexible.

Some participants have stated that requirements for the application process should be variable but agree that the application for smaller systems should be a simplified process. Certain aspects of an interconnection are not always well suited to fixed time frame response. Nevertheless, an application process framework should be adopted and the resulting document used as a guideline for what needs to be done prior to final interconnection.

3.4.3 Current Technology & SCADA Requirements

All three committees discussed the issues of how the use of current technologies and Supervisory Control and Data Acquisition (SCADA) systems (items such as dispatch power, dispatch power factor, alarms, status of breakers, etc.) could be applied to maintain a safe and reliable system with DG connected. However, this area needs specific attention due to a lack of detail of what the current technologies include specifically and how well it will integrate with the existing (and future) distribution systems.

The UDC position agrees that any proven technology could certainly be reviewed/addressed, provided it does not compromise (1) equipment or personnel safety, (2) protective relaying and control functions, or (3) utility system reliability, integrity and power quality.

All three committees discussed the issue of real time flow analysis. This issue is also embedded contextually in the topic of mapping the system. UDCs are concerned with the cost of such analysis and the benefits to them of such a Geographic Information System (GIS) based system. Some argue that access to real time information is necessary for informed UDC and consumer decisions, to avoid areas of constraint or design projects for optimal impact.

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[13] SCP pgs. 7 & 8
[17] IS pgs. 24 & 33-34

The Advisory Committee acknowledges that new technology and SCADA requirements will likely emerge and accompany retail competition and industry restructuring. It therefore suggests new tariffs may need to consider technological enhancements that might benefit both the UDC and DG customers. This topic is well suitable for the tariff and implementation workshops recommended in Sections 3.1.1 and 3.1.3.

3.4.4 Critical Information Needs Regarding Distribution Planning

There is a need for improving access and exchange of information between consumers and UDCs in regards to DG implementation. This information exchange primarily effects two areas:

1. Planning distribution system improvements reflecting the potential impacts of DG
2. Data requirements as it relates to system operations for UDC's and consumers

A primary concern is how the information is managed and the security and privacy needs that accompany system security practices and confidential UDC and consumer business data.

The Advisory Committee recommends that rulemaking needs to consider how to factor all of these issues in the process of developing rules for DG.

3.4.5 Study DG on Network Systems

Both the IS and AMD Committees addressed the impact of DG on the grid and future design factors related to DG interconnecting with a distribution network system. This task was assigned to the IS Committee and discussed at length without consensus being reached as to under what circumstances and at what cost such interconnections can be safely accomlished. Network systems differ from radial distribution systems in that have multiple lines interconnected for service. This leads to additional technological considerations when considering DG interconnections.

Therefore, to achieve further resolution, the Advisory Committee suggests that the ACC sponsor a workshop specifically designed to further research the matter with statewide and nationwide experts before any ruling prescribes one solution versus another.

3.4.6 Disparity of treatment between customers with and without DG

An important issue that emerged from all three committees is a perception that there may be a disparity of treatment between customers with and without DG. The following list identifies examples of where there may be disparity in how UDCs' deal with interconnection of new customer load and DG customer interconnections:

1. Upgrade of system infrastructure
2. Study requirements
3. Protection issues as they relate to the above points

Technical and economic issues may merit special consideration depending on the specific characteristics of a project. Avoiding disparity in treatment needs to be addressed in the ACC rulemaking process.

3.4.7 Distribution Planning With DG

Section F.4 of the AMD Committee report reflects current utilities views regarding distribution planning with DG. Many of the DG technologies are unproven and DG implementation is in an infancy stage. This shapes the existing distribution planning paradigm described in the above-mentioned report. However, the AMD committee agrees that future distribution planning should consider modeling implementation of DG.

Tariffs can affect the certainty of when generation would be on during a distribution capacity constraint. DG on a feeder does affect the capacity utilization of the feeder. The benefit of that freed-up capacity is variable depending on local conditions. Taking into account the DG, the tariffs used, system conditions, and other factors will all influence the planning process.

It appears that much work remains to be done here. Benefits to system need to be identified and addressed. UDCs may need to take into account DG when forecasting system improvements. Procedures need to be established that allows the UDC to plan.

3.4.8 Pre-certification of Equipment

Both the IS and the SCP Committees dealt with pre-certification. The SCP Committee drafted a white paper discussing options for types of equipment certification. Equipment pre-certification falls into two categories: (1) certification of the generation equipment, and (2) certification of interconnected DG systems. The SCP Committee[18] agreed that certification of the generation equipment was optional to the DG Provider. The Committee found that residential units 10kW or smaller should not require certification and permitting, other than normal local jurisdictional requirements.

The Committee also allowed that all DG interconnections are subject to both local jurisdiction permitting compliance and UDC approval. However, it was felt that a streamlined approach could be taken once the local jurisdictions and UDCs experienced several installs of the same type.

Discussions from the IS Committee and UDC representatives reflect that they do not have an objection to 3rd party certification (ETL/UL) for individual gensets. The UDCs will continue to require verification that all interconnection requirements have been met on a site-specific basis prior to interconnection with the distribution system.

3.4.9 UDC Ownership of DG

No committee was assigned the task of specifically dealing with UDC ownership of DG. However, two specific viewpoints emerged in committee discussions of this issue. One view is that UDC ownership in the form of a small central station could be economic in some instances for system reliability purposes. Therefore, UDCs take the view that they should not be prohibited from owning DG.

On the other hand, DG advocates believe that a serious potential for conflict of interest would exist if a DG was owned by an UDC. Participants supporting this view feel that UDCs could

[18] SCP pgs. 6 &7

issue RFPs to realize DG benefits in a specific area, but contend that with UDC ownership and operation of DG there is the potential for an unfair market advantage over other competitors and a potential double standard for interconnection requirements.

The two above positions are counterpoised and need to be brought into the DG rulemaking process for consideration. Given restructuring of the electric industry via the ACC's Retail Electric Competition Rules, there is a perception that DG ownership may also potentially conflict with a utility's Code of Conduct and Settlement Agreements.

3.5 Value of Additional Stakeholder Input

Section 2.4 of this report documents that participants in the DGI investigation process represent a variety of stakeholders including utilities, competitive energy service providers, equipment manufacturers, distributors, contractors, customers, as well as other organizations. However, the Advisory Committee recommends that the DGI Workgroup results be reviewed by a wider audience to better assess the work product and gain additional input for critical unresolved issues. To be clear, the DGI Workgroup is not intending to expand its mission to issues that are under the jurisdiction of other state, county or local entities. Rather, the purpose of the proposed additional review is to ensure that parties who may be impacted by the ACC's DG rule-making proceedings are aware of the DGI investigation information and proposed recommendations.

Organizations targeted for additional review of the DGI investigation work product are grouped and listed below. The recommended additional review will be accomplished by distributing the DGI Workgroup Final Report to the identified groups and following up for comments or questions. Additionally, some organizations such as the rural utilities and state, county and local officials may merit a presentation and discussion of the DG report and related issues.

3.5.1 Rural Utilities

The major Arizona utilities were key participants in the process. However, the Advisory Committee recommends that planning and rate representatives from the smaller rural utilities should also review any proposed rules and tariffs.

1. Electrical Cooperatives
2. Citizens Utilities
3. Municipals

3.5.2 Additional Customers

A few customers, such as several Arizona cities, were involved in the initial process, and Advisory Committee. However, proposed standards, tariffs, and policies should be reviewed by a broader range of industrial, commercial, and perhaps even residential customers. Examples include:

1. Industrial Customers or Associations
2. Hospitals
3. Universities and colleges
4. Commercial Chain Accounts
5. Government/military customers

3.5.3 Other Certified Energy Service Providers

A certified energy service provider (ESP) may offer DG as a competitive option for customers. They may also serve as a customer's energy broker for the excess power from DG. The Advisory Committee recommends that a number of licensed ESPs review the policies during the rulemaking process. Examples include:

1. NewEnergy
2. Sierra Southwest
3. Enron
4. Sempra
5. APS Energy Services
6. New West Energy

3.5.4 Other Manufacturers and Contractors

Several major DG equipment manufacturers were represented in the workgroup. Nevertheless, the Advisory Committee recommends that the proposed standards be reviewed by a broader range of manufacturers and contractors.

3.5.5 Arizona Independent System Administrator

Several issues such as the operational procedures, the potential use of DG for ancillary services, and the scheduling of power sales from DG should be reviewed by the ISA.

3.5.6 National Organizations

The interconnections and safety standards should be reviewed by and compared with other national organizations, which are also formulating DG standards and policies. These organizations include:

1. Federal Energy Regulatory Commission (FERC)
2. National Electric Manufacturers Association (NEMA)
3. Edison Electric Institute (EEI)
4. Institute of Electrical and Electronics Engineers (IEEE)
5. National Electrical Code (NEC)
6. National Environmental Safety Compliance (NESC)
7. National Fire Protection Association (NFPA)
8. Underwriters Laboratories (UL)

3.5.7 State, County, and City Agencies

Finally, the policies and standards adopted by the ACC may impact or influence the policies of other governmental agencies in Arizona. The Advisory Committee recommends that these organizations should be included in the review process where appropriate. Potential organizations include:

1. Arizona Legislature
2. State of Arizona agencies
3. Maricopa County
4. Pima County
5. Major Cities
6. Rural Counties and Cities

Section 4: Comments Submitted Regarding Process and Committee Reports

A review period was provided for all interested parties to submit formal comments following publication of the final reports of the three DGI Workgroup Committees. Eleven parties submitted comments by the December 22, 1999 dateline. Those comments were filed with ACC Docket Control and are listed among the referenced material in Appendix C. Many of the concerns and issues raised in the formal comments have already been addressed in Section 3 of this report. This section summarizes the residual issues submitted as comments by stakeholders and interested parties. This section includes an analysis of whether consensus is feasible, along with suggested courses of action for the ACC.

4.1. Is a Visible Disconnect Switch Necessary at all Sites?

All parties agree that an accessible, lockable disconnect switch to isolate the DG from the grid is an essential part of safe operation of DG on the UDC's distribution system. Utilities are requiring that the device be a "visible, open" disconnect switch. Some parties have requested that the disconnect use electronic verification rather than physical verification. The Advisory Committee agrees there needs to be a clear definition of what a visible, open disconnect is as it applies to the UDC interconnection for DG.

4.2 Metering

Comments were submitted concerning what type of metering should be required for DG interconnection. The Advisory Committee agrees a consensus should be reached on statewide metering standards that can be adopted for DG. Proposed ACC rules need to reflect technical solutions available for metering purposes. Some consensus was reached in the AMD Committee on various situations where specific metering equipment would be needed for various tariff options.

4.3 DG Policy

Parties' comments included asking that: a) the ACC oversee the DG market in its formative stages and b) the ACC prescribe the role of the UDC vis-à-vis DG. The Advisory Committee suggests that ACC Staff proceed to clarify jurisdictional issues that may impact the potential deployment of DG in Arizona. These would include rulings on PURPA or PUHCA regulations that may either hinder or unduly advantage such deployment, especially considering the movement in Washington to repeal both these acts as part of a federal restructuring bill pertaining to electricity. Additionally, the ACC's upcoming DG rulemaking may provide a platform for modifying the current Arizona Competition Rules as appropriate.

A

Appendix A: Summary List of DGI Workshop Group Breakout Issues

Safety

1. Ensure Protection of Workers / Customers
2. Safe Practices for Connection / Isolation of Distributed Generation to / from System
3. Training and Certification / Licensing Process for Workers
4. Standardized Safety Requirements Conforming to NEC / OSHA, etc.
5. Zero Tolerance on Unsafe Conditions
6. Distinguish Safety Requirements for Large vs. Small Customer Applications

Siting

1. Size Thresholds for Which Siting Is a Public Issue
2. Tracking / Mapping of Distributed Generation for UDC Capacity Planning
7. Who Pays for Underutilized Distribution Facilities Resulting From Distributed Generation Siting

Certification / Permitting

1. Certification of Distributed Generation System Package
2. Who has Jurisdiction Over
   - Tariffs, Cost Shifting
   - Grid Access
   - Reliability

Distributed Generation Fuel Requirements

1. Is a Fuel Preference Policy Needed (Gas, Solar, Wind, H_2, etc.)
2. Is a Fuel Pressure Standard Needed for Distributed Generation
3. Who Pays For Fuel Delivery Infrastructure
4. Delivery of H_2 as By Product of Fuel Cell Application

Location and Types of Distributed Generation Connections

1. Consider Standards for Inverter vs. Synchronous Connections
2. Should Standards Distinguish Between Trans., Dist., and Customer's Service System Connections
3. Can a Location Match be Achieved for Mutual Benefit of Customer and UDC
4. Application Process Standardized and Streamlined
5. Must be an Electric Service Provider to Re-Sale?

Points of & Types of Interconnection

1. UDC's Total Control a Concern - Jurisdiction of All Utilities (Including SRP) for Interconnections
2. Standardize Equipment for Monitoring and Verification of Interconnection
3. Site Specific Considerations vs. Interconnection Standards
4. Parallel vs. Islanded Operations of Distributed Generators
5. Is There a Distributed Generator Size Limit for Particular Interconnections

Power Quality

1. Distributed Generation Compliance with WSCC / NERC / IEEE and Industry Standards
2. Power Factor, Harmonics, Voltage Flicker, Frequency and Voltage Control Concerns
3. Bilateral Power Quality Impacts of Distributed Generators, Utilities and Other Customers
4. How to Monitor and Enforce

Operational Interdependence

1. How will Distributed Generator Customers Contribute to Ancillary Service Requirements
2. Interface Equipment Must Provide Bilateral (Mutual) Protection / Voltage Control
3. System Dispatch / Control for Mutual System Benefit
4. Management of / Response to Disturbances
5. More Complex Operational Requirements When Many Distributed Generators Co-exist
6. Customers Reliance on Utility for Operational and Engineering Expertise

System Dynamics

1. Automatic Voltage Regulation / Power System Stabilizer / Unit Testing Requirements
2. Distributed Generator Load Following Capability
3. Real-time Pricing Affect on System Dispatch and Operation
4. Automation via Supervisory Control and Data Acquisition

Operational Controls

1. Who Should Control Distributed Generator - Customer vs. Control Area Operator
2. Should Manual or Automatic Controls Be Used
3. Customer Issue: Controls Need To Follow Load To Maximize Investment
4. If Control Area Operator Dispatches Unit-Standards for Control & Telemetry Equip. Interface
   - Voltage Control
   - Power System Stabilizer
   - Governor Response (Frequency)
5. Dynamic Signal if Regulating or Load Following
6. If Utility Benefits From Dispatch of Units - How is Customer Compensated

Telemetry

1. Telemetry Required For Parallel Operation (Sell Back)
2. Distributed Generator Telemetry to Send Real Time Data to Control Area Operator
3. Transfer Tripping Distributed Generator for Disturbance on Distribution System
4. Who Owns the Information / with Whom is Information Shared
5. Who Pays the Cost for Telemetry
6. Is Net Metering Allowed

Protection Requirements

1. Uniform Standards or Utility Specific
2. Balance Economics / Safety
3. How Much Control Should Utility Have In Defining Requirement
4. Dependent Upon Unit Size and Location in System
5. Define by Type of Unit and Type of Utility Interconnection

Other Issues / Concerns

1. Environmental
2. Customer Education
3. Who has Jurisdiction - ACC vs. FERC, ISO, Local, etc.
4. Scheduling Requirement
5. Pricing - Rates / Incentives
   - Utility Tariffs - Backup, Stand-By, Supplemental, Emergency, Buy-Back
   - Cost -Shifting - Who Pays Cost of Departing Customer
   - Should Distributed Generation be Allowed to Bypass Wires Charges
   - Monetary Compensation for Grid Benefits of Distributed Generation
   - Providing Opportunity / Encouragement for Smaller Dist. Generation (i.e. Residential)
   - ACC Incentives for some DG, if Cost Increases for Others, But Overall Cost is Reduced

B

Appendix B: Summary List of Participants DGI Investigation Docket No. E-00000A-99-0431

Name	Organization	Workshop	Workgroup	SCP Committee	AMD Committee	IS Committee	Advisory Committee
DON ADAMS	TEP	P					
BAJ AGRAWAL	APS		P				
ROBERT ARPIAO	MARICOPA COUNTY AIR QUALITY	P					
PHILLIP ASBURY	SSVEC	C					
PREM BAHL	RUCO	C	P		C	P	P
ROBERT BALTES	BVA	P	P			C	
JAMES BARRY	TEP	P	P	C			
STEVE BISCHOFF	APS	C	P		C		C
RICH BITNER	RPD ABBOTT LABS		P				
ROB BORCICH	STEWART & STEVENSON		P		P		
JANA BRANDT	SRP	P	P	P			
CARL BRITTAIN	IBEW LOCAL 387		P			C	P
ROBERT BROWN	SIERRA SOUTHWEST	P	P		C		
LINDA BUCZYNSKI	CITY OF TUCSON	P	P	P		C	C
BRUCE BUFFUM	SOUTHWEST ENERGY SOLUTIONS					P	
MIKE BURKE	NEV TECHNOLOGIES	C					
MIKE BUSQUAERT	PHOENICIAN RESORT	C					
PHIL CEA	APS	P					
M CHURCHILL	AGRA SIMONS		P				
PHIL CLARK	TUCSON ELECTRIC		P				
ANNE COBB	TRICO ELECTRIC COOP		P	C			

C = Chairman, Co-Chairman, Committee Member or Panelist
P = Participant

Name	Organization	Workshop	Workgroup	SCP Committee	AMD Committee	IS Committee	Advisory Committee
KENT CROUSE	SW GAS		P			P	
CHUCK CULLOM	SW WIND POWER	P					
GREG CZAPLEWSKI	CUMMINS SOUTHWEST	P	P	P			
DAVID DAER	SRP		P		P		
KEITH DAVIDSON	ON SITE SYCOM ENERGY CORP	C					
LEE DEBAILLE	MARICOPA COUNTY	P					
CHUCK DECORSE	TUCSON ELECTRIC	C	P			C	C
WILLIAM DELONG	SOUTHWEST GAS	P	P		P		
RANDY DESPAIN	CITY OF PHOENIX	P	P	C			
DAVID T. DRUMMOND	NEW ENERGY	P	P		C		C
KEVIN DUGGAN	CAPSTONE TURBINE CORP					P	
REBECCA EICKLEY	CITY OF SCOTTSDALE	P	P		P		
CHARLES EMERSON	TRICO	P					
BRUCE EVANS	AEPCO		P		P		
DANIEL FITCHITT	CITY OF TEMPE	P					
RON FRANQUERO	ACC	C	P		C		
ART FREGOSO	TEP		P	P			
TOM FRIDDLE	APS	P	P	P			
REBEKAH FRIEND	IBEW						P
LINDY FUNKHOUSER	RUCO						P
CAROLINE GARDINER	SOUTHWEST ENERGY SOLUTIONS		P			P	
LANE GARRETT	ETA ENGINEERING INC	P					
DENNIS GERLACH	SRP	C	P		C		
BRYAN GERNET	APS	P	P	P		C	P
ED GIESEKING	SOUTHWEST GAS	P	P			C	
WALT GOODMAN	IBEW LOCAL 266				C		
DANIEL GOODRICH	SRP		P		P	C	C
ELENA GORELLE	MARICOPA COUNTY	P					
JEFF GULDNER	SNELL&WILMER	P					

C = Chairman, Co-Chairman, Committee Member or Panelist
P = Participant

Name	Organization	Workshop	Workgroup	SCP Committee	AMD Committee	IS Committee	Advisory Committee
JEFF HAGEN	SW GAS			P			
TOM HANSEN	TEP	P			P		
JEFF HANSON	PHASER ADVANCED METERING SERVICE		P				
BOB HESS	SALT RIVER PROJECT	C					
LARRY HOLLY	SW GAS	P	P	C			
MIKE HOUSLEY	APS ENERGY SERVICES	P					
VINNIE HUNT	CITY OF TUCSON	P					
JEFF JACOBSON	SOUTHWEST GAS	P	P		C		C
LINDA JAMES	ROBERT S. LYNCH		P				
SUZANNE JUN	TEP						P
WILLIAM KASZETA	PHOTOVOLTAIC RESOURCES		P				
BARBARA KEENE	ACC	C	P	C			
BARBARA KLEMSTINE	APS	P			C		
BARRY KREUZER	GENERAC		P			C	
DIMITROS LALAUDAUS		P					
RICK LARUBETH	APS	P					
TERRY LINDE	AGRA SIMONS		P		C		
WARREN LOUIS	ALLIED SIGNAL POWER SYSTEM		P	P			P
SHARON MADDEN	APS		P	P			
DOUG MANN				P			
SCOTT McCULLOUGH	MARICOPA COUNTY PLANNING DIVISION	P					
TIM McDONALD		P					
JOE MCGUIRK	ME CONSULTANTS		P				
SARAH MCKINLEY	DISTRIBUTED POWER COALITION OF AMERICA	C					
SCOTT McLELLAN		P					
PAUL MCQUIRE	TOUCHSTONE ENERGY				P		
AIDAR MCSHEFFREY	SRP		P		P		

C = Chairman, Co-Chairman, Committee Member or Panelist
P = Participant

Name	Organization	Workshop	Workgroup	SCP Committee	AMD Committee	IS Committee	Advisory Committee
MATT MEDVRA	ESI	P					
W W MEEK	AUIA	P	P		P		P
ANDREW J MEYER	TUCSON ELECTRIC		P			P	
CHUCK MIESSNER	NEV	P	P		C		C
PATTI MORRIS	TEP	P	P	C			
BILL MURPHY	CITY OF PHOENIX	C	P	P	P	C	C
DOUGLAS NELSON	DEAA	P	P	P			
DAVE NICHOLS	TRW VEHICLE SAFETY SYSTEMS	P					
BRIAN O'DONNELL	DEAA	P	P	C			C
RON ONATE	APS		P			P	
DAN PARMLER SR	DIVERSIFIED TECHNICAL SVCS	P					
MICHAEL PATTEN	BROWN & BAIN	P					
GERALD PAULOS		P					
MATT PUFFER	ENGINE WORLD	P	P	C			C
GEORGE RASH	NEW ENERGY		P	P			
BEATRICE RIVERA	ALLIED SIGNAL						P
KELLY ROGERS	RPD ABBOTT		P		P		
MICHAEL ROSS	RW BECK		P			C	
DAVID RUMOLO	GRAND CANYON STATE ELECTRIC COOP ASSOC						P
RANDY SABLE	SOUTHWEST GAS	P	P		P		P
EDWARD SALGIAN	BVA	P					
JEFF SAMS	SSVEC		P			P	P
ROY SAPP			P				
STEVE SCHMOLLINGER	TEP	P	P		C		C
RICK SCHUMM	SRP	P					
MIKE SCWINDENHAMMER	SSVEC	P	P				P
SEAN SEITZ		P					
BRYAN SIEVERS	EMPIRE POWER SYSTEMS		P	P			
CHUCK SKIDMORE	CITY OF SCOTTSDALE		P	C	C		

C = Chairman, Co-Chairman, Committee Member or Panelist
P = Participant

Name	Organization	Workshop	Workgroup	SCP Committee	AMD Committee	IS Committee	Advisory Committee
MARK SKOWRONSKI	ALLIED SIGNAL	C					
JERRY SMITH	ACC	C	P	P	P	C	C
BOB SMITH	APS	C			P		
JERRY SMITH	APS	P	P		P		
SCOTT SWANSON	APS		P	P	P		P
PAUL TAYLOR	RW BECK	P	P		C		
WILLIAM THOMAS	RPD ABBOTT		P		C		
DAVID TOWNLEY	NEW ENERGY INC	C	P	P		C	C
TONY TURTURRO	INDUSTRIAL CONSULTANTS GROUP		P				
KEITH VAN AULSDAL	APS		P		P		
RICK VOGEL	TOUCHSTONE ENERGY		P				
ERNEST WAKEFIELD	SRP		P			P	
CHRIS WEATHERS	APS		P				
BUB WHEELER	ENGINE WORLD INC		P		C		
LAUREL WHISLER	AZ INDEP. SCHEDULING ADMIN ASSOC	C					
RAY WILLIAMSON	ACC	C	P	P		P	P

C = Chairman, Co-Chairman, Committee Member or Panelist
P = Participant

C

Appendix C: DGI Reference Material Filed in ACC Docket Control Docket No. E-00000A-99-0431

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2. Access, Metering and Dispatch Committee, DGI Workgroup, "Access, Metering and Dispatch Committee Final Report," November 24, 1999.
3. Access, Metering and Dispatch Committee, DGI Workgroup, "Executive Summary," December 15, 1999.
4. Interconnection Standards Committee, DGI Workgroup, "Arizona State Draft Interconnection Requirements For Distributed Generation," Revision 3, December 1 1999.

Formal Comments to DGI Workgroup Committee Reports

5. David Townley, Vice President, Business and Product Development, New Energy, "Comments on the Final DG Committee Reports," December 22, 1999.
6. Bill Murphy, City of Phoenix, "Some More Thoughts on the Process," December 22, 1999.
7. Linda Buczynski, Electrical Engineer, City of Tucson, "Docket No. E-00000A-99-0431," December 17, 1999.
8. Ed Gieseking, Manager, State Regulatory Affairs, Southwest Gas Corporation, "Southwest's December 22 Comments," December 22, 1999.
9. Robert T. Baltes, Principal, Baltes/Valentino Associates, Limited, "Oversight Committee," December 21, 1999.
10. Walter W. Meek, President, Arizona Utility Investors Association, "In the Matter of the Recommendations of the Distributed Generation and Interconnections Workgroup," December 22, 1999.
11. Honeywell, "General Investigation of Distributed Generation and Interconnection: Comments of Honeywell Power Systems, Inc.," (includes two attachments), December 22, 1999.
12. Distributed Power Coalition of America, "Arizona Corporation Commission Workshop on Distributed Generation: Comment on the Final Committee Reports," December 22, 1999.
13. Rick Gilliam, Senior Technical Advisor, Land and Water Fund of the Rockies, "Comments on Distributed Generation and Interconnection Issues," December 15, 1999.
14. "APS Comments on Distributed Generation and Interconnection Workshop," December 22, 1999.
15. Chuck DeCorse, Senior Electrical Engineer, "TEP Comments to ACC Interconnection," December 22, 1999.

DGI Investigation White Papers

16. Carl C. Brittain, Arizona Public Service and the IBEW local union 387, "Case for No Distributed Generation in the Utility Network System," November 17, 1999.
17. Carl C. Brittain, Arizona Public Service and the IBEW local union 387, "Dispatch," November 24, 1999.
18. Carl C. Brittain, Arizona Public Service and the IBEW local union 387, "Training and Certification," November 23, 1999.
19. Jim Corbin, President of IBEW local union 1116, "Training and Certification," September 14, 1999.
20. Carl C. Brittain, Arizona Public Service and the IBEW local union 387, "Adequate Grounding at Distributive Generation Sites," November 23, 1999.
21. Carl C. Brittain, Arizona Public Service and the IBEW local union 387, "Time Frame and Assurance of Proper Mapping of Distributive Generation," November 23, 1999.
22. B. O'Donnell and T. Turturro, "Thresholds and Jurisdiction," September 29, 1999.
23. Chris Weathers, DEAA, "Distributed Generation Application Process," October 6, 1999.
24. Siting, Certification and Permitting Committee, DGI Workgroup, "Siting Certification Outline," October, 1999.
25. DEAA, "Distributed Generation Application Process," October 4, 1999.
26. Arizona Public Service Company, "White Paper Regarding Issues Set Forth by Siting, Certification, and Permitting Committee," submitted as attachment to the meeting minutes, October 25, 1999.
27. Arizona Public Service Company, "APS Comments to Meeting Minutes of October 7, 1999."
28. "Location and Types of Distributed Generation Connections: Prepared for the Siting, Certification and Permitting Subcommittee," November 4, 1999.
29. Tony Turturro (ICG) and Bryan Gernet (APS), "DG Application Process," drafts #1 and #2, November 18, 1999.
30. Sarah McKinley, Distributed Power Coalition of America, "An Overview of State and Federal Initiatives for Distributed Generation," DGI Workshop, June 28, 1999.
31. Jerry D. Smith, Arizona Corporation Commission, "Minutes and Notes of the June 28, 1999 DGI Workshop," July 20, 1999.
32. Scott A. Castelaz, Encorp, "The Business Case for the Virtual Power Plant," DGI Workgroup Meeting, October 25, 1999.
33. David Moskowitz, Regulatory Assistance Project, "Profits and Progress Through Distributed Resources," draft report to NARUC, July 15, 1999.
34. Daniel A. Goodrich, Salt River Project, E-Mail of four document extracts addressing "Islanding," from SMUD, PSCo, Texas PUC, and SRP, November 5, 1999.
35. Texas PUC, "Substantive Rules, Chapter 25, Electric," pages 17-21.
36. Maricopa County Planning and Development Department, "Agenda Item: 12 - TA 99-06," pages 1-6, September 16, 1999.
37. State of Arizona, "Direct Access Service Request Handbook," October 14, 1999.
38. Pricing Department, Arizona Public Service Company, "Key Distributed Generation Issues," November 9, 1999.
39. Linda Buczynski, City of Tucson, "Comments on Advisory Committee Draft Final Report," March 7, 2000.
40. Stephen Bischoff, Arizona Public Service Company, "Comments on Advisory Committee Draft Final Report," March 13, 2000.

41. Steve Schmollinger, Tucson Electric Power Company, "Comments on Advisory Committee Draft Final Report," March 8, 2000.
42. Mark Skowronski, Honeywell, "Comments on Advisory Committee Draft Final Report," March 13, 2000.
43. Mark Skowronski, Honeywell, "Regulatory Barriers to Distributed Generation Technologies," for NARUC Winter Meeting, March 2000.

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ACC Special Open Meeting Minutes
Distributed Generation & Interconnections Workgroup
Advisory Committee

Date: February 28, 2000 **Time:** 9:30 AM

Location: Pipeline Safety Conference Room
1200 W. Washington St., Phoenix, AZ 85007

Purpose: A special open meeting to consider Distributed Generation & Interconnections (DGI) per Docket No. E-00000A-99-0431.

Attendance:

- No Arizona Corporation Commissioners present
- Committee Members present – Jerry D. Smith (ACC), Brian O'Donnell (DEAA), Chuck Miessner (NE), Chuck DeCorse (TEP), Bill Murphy (City of Phoenix), Steve Schmollinger (TEP), Matt Puffer (Engine World), Steve Bischoff (APS), Dan Goodrich (SRP), David Townley (NEV Technologies), Jeff Jacobson (SW Gas) and Dave Drummond (DPCA).
- Committee Members absent –Linda Buczynski (City of Tucson).
- Others present – Scott Swanson (APS), Bryan Gernet (APS), Prem Bahl (RUCO), Bill Meek (AUIA), Suzanne Jun (TEP), Doug Nelson, Don Leher (Gen-Tech), and Robert Annan (ACEIA).

Meeting Summary:
The Advisory Committee meeting was called to order by its chairman at 9:30 AM. Jerry Smith welcomed those in attendance and reminded them that the meeting had been properly noticed as a special open meeting and proceedings are open to the general public. The meeting began with a review of the agenda and approving the minutes of the February 22, 2000 meeting. The minutes were approved as written. The remainder of the meeting was devoted to completing review of the draft DGI Workgroup Final Report.

Action Items:

1. It was agreed that the final reports of the three DGI Workgroup Committees would not be provided as appendices to the Advisory Committee report since the documents were previously distributed electronically, filed with ACC Docket Control, and are posted on the ACC website.
2. Jerry Smith is to electronically submit to Matt Puffer the "Acknowledgement" page that identifies the Advisory Committee for insertion in the final report prior to the "Table of Contents."
3. It was agreed that the eleven formal comments submitted regarding the three DGI Workgroup Committee Reports would not be included as an appendix since many are not available in electronic format. These formal comments are filed with ACC Docket Control and will be referenced in the final report's appendix listing ACC Docketed materials for DGI.
4. Matt Puffer is to complete the report revisions agreed upon in the meeting and redistribute the report to the Advisory Committee members.

5. The Advisory Committee Chairman will distribute the final report to all parties that have attended the Advisory Committee meetings. A review period of one week will be allowed for any residual comments regarding the report. Comments are to be electronically submitted to Jerry Smith and will be resolved via E-Mail and phone call as required.
6. The DGI Workgroup Final Report will then be distributed electronically to all interested parties to the DGI investigation and filed in ACC Docket Control. This will conclude the DGI investigation process.
7. ACC Staff will begin drafting proposed rules regarding DG upon receipt of the DGI Workgroup Final Report.

Meeting adjourned at 5:30 PM.

Recorded by: Jerry D. Smith, Utilities Division, Arizona Corporation Commission

CITY OF TUCSON DEPARTMENT OF OPERATIONS

Technical Planning & Resources Division

P.O. BOX 27210 · 85726

(520) 791-5111 x332
FAX: (520) 791-2567

March 7, 2000

Jerry Smith, PE
Utilities Engineer
Utilities Division
Arizona Corporation Commission
1200 West Washington
Phoenix, AZ 85007

SUBJECT: Docket No. E-00000A-99-0431
Comments on the Advisory Committee Draft Final Report

Dear Mr. Smith:

The following are comments from the City of Tucson on the Arizona Corporation Commission's (ACC) Distributed Generation (DG) and Interconnection Investigation Workgroup (draft) final Report, generated March 6, 2000.

The first few comments deal with wording on the Acknowledgements Page and in the Executive Summary. According to the first paragraph of the Acknowledgements, "This report ... consolidates results of the three DGI Workgroup committees' reports into one document". Section 1.1 states "This report provides...recommendations for developing standards, policies and tariffs for distributed generation (DG) through the rulemaking process." Both of these statements are misleading, for the entire document contains no such summary, nor does it specifically recommend that the task items for which consensus was achieved be taken into consideration in the upcoming rulemaking process.

Perhaps the most efficient way to address this would be to rewrite the introductory paragraph to 1.5. "The three Workgroup Committees effectively ~~tended to~~ completed their assigned work scope. ~~and produced final reports.~~ They researched and debated issues from the vantage points of the various stakeholders, but did not necessarily resolve them in the Workgroup process. Final reports from the three Workgroup Committees detailed areas of consensus and identified areas where such consensus had not been achieved. It is recommended that the subsequent rulemaking process take into consideration subject areas where participating stakeholders had achieved consensus. Regarding items where consensus had not been achieved, ~~The~~ the Advisory Committee identified several key issues that emerged in the Workgroup Process that need to be addressed in rulemaking, itemized below. For several of the issues, the Advisory Committee recommends that workshops be held to acquire additional information. The ACC rulemaking process should ~~establish~~address:"

Subsection 1.2 in the Executive Summary states that "The purpose of this investigation was to explore the potential benefits of new technologies and customer choices and assess the technical and policy changes needed to implement DG, while continuing to maintain the safety and reliability of the electric grid." Although the question of cost versus benefits of DG pervaded much discussion and were the subject of two very fine white papers submitted in response to the Workgroup phase of the process, this actual item was never a specific task assignment. Neither was "potential benefits of customer choices" explored in the investigation. According to subsection 3.1.2 of the Advisory Committee draft Report, "...the value of DG was not a specific issue assigned to a committee..." As documented, the investigation simply set out to "assess the technical

and policy changes needed to implement DG, while continuing to maintain the safety and reliability of the electric grid".

Subsection 1.5 in the Executive Summary, Item 2, in its present context, implies that the ACC rulemaking process should establish "A better understanding of the benefits and costs of DG to the utility distribution grid." It is difficult to imagine staff or Commissioners under the present or any conditions of work load making much headway here without input from stakeholders. This may be another candidate for a workshop. The white papers submitted on December 22, 1999 by Mark Skowronski in response to the Workshop phase of the process, entitled "Comments on Economic Burdens and Obstacles Facing Distributed Generation", and "Proposed Methodologies for Evaluating Grid Benefits of Distributed Generation", could serve as a starting point for a stakeholder workshop on the subject.

The concluding paragraph of Subsection 3.2.4, Distribution Planning/Impacts Issues, refers to certain operational issues as being additional to the issues itemized in this Subsection, and which should be addressed in the operational workshop recommended in Section 3.1. The link to between this Subsection and 3.1.3 needs to be established, unless the operational issues referenced in 3.2.4 are different from those described in Subsection 3.1.3, in which case they should be described here.

The premise underlying Section 3.3, Conflicting and Divergent Committee Issues, is questionable for both of its subsections. In the case of Subsection 3.3.1, Categorizing Distributed Generation (DG) by Size, the IS and AMD committees respectively determined size categories for generators based upon criteria which were essentially derived from the nature of their task assignments. As a matter of fact, great effort was taken to insure that each committee devoted to its own task list. By definition of this independence of assignment, the size classifications could not have been identical except through pure coincidence. To state that the committees diverged is to imply that their respective processes to determine generation size categories commenced at the same starting point, which they did not. The present narrative, which employs wording such as "chose size classifications" and "selected the size categories", implies a subjectivity on the part of both committees which diminishes the the hard work involved in objectively determining such classification. If it is desirable to "harmonize" classification breakouts for the purpose of simplicity or whatever, perhaps key members of both committees could have been or could still be approached to bring this matter to "convergence". Yet there is no recommendation except very generally under the Section introduction that "further study and work is proposed to be committed". Furthermore, no reasoning is given why the existence of separate classifications for separate applications is undesirable. Too much time and effort has been spent in committee to come to such an unfocused presentation and conclusion.

Continuing with Section 3.3, Subsection 3.3.2, DG Unit Size Impact on Operational Concerns, contains no description of divergence between any of the Workgroup committees, no reason why such undefined divergence is a source of concern such that it deserves space or mention in a summary document such as this, and no recommendations as to how to deal with such unstated and undefined "conflict" or "divergence" as the process moves forward into rulemaking.

The concluding paragraph of Subsection 3.4.3, Current Technology & SCADA requirements, consists of a sentence which runs unclearly, but the concepts are valid. I've attempted to reword it according to my understanding of what it means.

Subsection 3.4.4, Critical Information Needs Regarding Distribution Planning, is unclear in its subject matter. Item One is treated later in the document as Subsection 3.4.7. If there is any difference or distinction between the two it is not expressed here. Item Two does not specify the nature of the data "required", who it should be provided to, or who it should be provided by, or why. The next paragraph refers to the balance of security versus privacy which the Commission will need to exact as it considers the sort of information needed by prospective DG developers as they perform due diligence in their feasibility studies, but nothing else in this subsection even vaguely references such a topic. Needless to say, the concluding paragraph leaves the reader dangling. Factor what issues? No issue has been articulated.

Subsection 3.4.5, Study DG on Network Systems, has been clearly stated as an issue, as has its recommendation. Minor corrections were intended to clarify for the non-participant reader the true nature of the question.

Subsection 3.4.7, as written in outline form, is inconsistent with the presentation otherwise seen in this document. The third sentence under *UDC Position* appears to say that it is saying what it is saying. (!) The subcommittee referred to in *Vendor/City Position* is not only undefined under that heading, but under that heading this wording implies that there was a subcommittee comprised solely of representation from municipalities and vendors which has achieved consensus as documented in this paragraph. The *Unified Position*, written in a tone which implies that it is making a recommendation, does not actually suggest anything of tangible use in the upcoming rulemaking process.

Subsection 3.4.9, UDC Ownership of DG, has been clearly stated as an issue, as has its recommendation, only in need of some minor corrections.

In Subsection 3.5.6, National Organizations, thanks for spelling out the acronyms. Try FERC too. But since the National Fire Protection Association (NFPA) has been added, I question the insistence on retaining the National Electrical Code (NEC) as an organization. As submitted in comments by the City of Tucson on February 25, 2000, the NEC is known as NFPA 70, and has been sponsored by that organization since 1911. This is taught as introductory material in the Electric League entitled "Electrical Codes and Inspection" and is right up front on the very first page of every Code issue under the heading "History and Development of the National Electrical Code."

Last but not least, in Appendix C, under Formal Comments to DGI Workgroup Committee Reports, Number Three, please correct the spelling of my last name. This correction has been submitted before. While on that page, in Number Five, consideration might be given to correcting "Oversite" to "Oversight" unless the policy is to transcribe authors' typographical errors as submitted.

Attached for your convenience is a file entitled "DGILAB6.DOC" wherein certain recommended changes have been made. Those changes which were typographical, grammatical, or representative of minor clarifications have not necessarily been discussed above. All changes were made using the "track Changes" feature, which allows the reader to advance from one change to the next in succession.

We appreciate having been included in this stage of the process. If you have any questions about the above comments, or if you need any further assistance in achieving the present milestone, please call at (520) 791-5111 x332.

Sincerely,

Linda Buczynski, PE
Electrical Engineer

C: Advisory Committee Members
Advisory Committee Observers

A subsidiary of Pinnacle West Capital Corporation

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Title
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March 13, 2000

Jerry Smith, PE
Utilities Engineer
Utilities Division
Arizona Corporation Commission
1200 West Washington
Phoenix, AZ 85007

SUBJECT: Comments on the Advisory Committee Draft Final Report
Docket No. E-00000A-99-0431

Dear Mr. Smith:

The following is a summarization of the comments from Arizona Public Service Company (APS) on the Arizona Corporation Commission's (ACC) Distributed Generation (DG) and Interconnection Investigation (draft) Final Report dated March 6, 2000.

APS has reviewed the comments on the Advisory Committee Draft Final Report submitted by Linda Buczynski (City of Tucson) on March 7, 2000 and supports the incorporation of the marked changes into the final report.

Subsection 1.2 in the Executive Summary states the following: "The purpose of this investigation was to explore the potential benefits of new technologies and customer choices and assess the technical and policy changes needed to implement DG, while continuing to maintain the safety and reliability of the electric grid." APS agrees with the City of Tucson that the question of cost versus benefits of DG was never a specific task assignment. In addition, the above-stated purpose differs considerably from the original purpose of the ACC DGI Workgroup as stated and approved in the Organizational Proposal dated August 26, 1999. This portion of the Executive Summary should read as follows to be consistent with the purpose stated in the Organizational Proposal: The purpose of this investigation was to: 1) Consider issues raised at the June 28, 1999 DGI Workshop and related issues arising during investigation of the DGI topic; and, 2) Formulate a framework for accommodating DGI applications in Arizona.

Subsection 1.5 of the Executive Summary summarizes the key findings and recommendation for rulemaking. APS proposes to add the following language at the end of this subsection to summarize the beliefs of the Advisory Committee concerning implementation workshops: The Advisory Committee believes that workshops will be needed after the ACC DG rules are approved to address the implementation of various technical, operational, and/or tariff issues which were not specifically addressed.

APS believes that the following portion of Subsection 2.2.3, Interconnection Standards Committee Work Scope should be deleted for brevity purposes: "For example, Scott Castelaz of Encorp gave a presentation entitled "The Business Case for the Virtual Power Plant" that discussed how new technology is being implemented in the utility industry to affect the deployment of DG. Mr. Castelaz advised that the US might benefit from looking at how Sweden, the United Kingdom and New Zealand have accommodated distributed resources. In addition, he suggested that the IEEE interconnection standards would have a weak influence in Arizona's process because their development is progressing too slowly. He cited numerous US system experiences that serve as examples of why DG is needed now to provide quick short-term solutions to system problems." In addition, APS proposes to insert the following sentence near the end of this subsection (before the last sentence in this subsection): On other occasions, certain items were identified but not adequately addressed.

Subsection 3.1.1 (Tariff Issues) of the Workgroup Process Assessment and Critique discusses tariff issues. APS believes that the following tariff issue should be included as item 6 under issues that were not addressed in the AMD Committee report: 6. Disparity of treatment between regulated and non-regulated UDC's.

The third paragraph in subsection 3.3.1, Categorizing Distributed Generation by Size, discusses the fact that the size categories established in the IS Committee and the AMD Committee were based on different parameters with each breakdown being important within it's own respect. To further clarify this issues, APS proposed to at the following language to the end of this paragraph: Since the two have very little in common (one for generator protection, the other for economic development and feeder location/loading) there does not appear to be any over-riding reason that the two should necessarily be matched.

APS would like to restate its objection to including "Rule of Thumb" criteria in subsection 3.3.2, DG Unit Size Impact on Operational Concerns, of the draft final report. APS believes that UDC objections to these "Rules of Thumb" should be noted in the final report.

Subsection 3.4.1 (Obligation to Buy From DG) of the Workgroup Process and Critique discusses the buyback of excess power from interconnected DG. Our notes from the last Advisory Committee Meeting show that paragraph 3 of this subsection was struck. Please review your notes to see if this is correct. Specifically, the following should be deleted from subsection 3.4.1 of the final report: "In the AMD Committee discussions, there was an agreement that PURPA was no longer the benchmark to use for either pricing power or buying it back, but that instead the "market" was the appropriate mechanism to use. It was the non-UDC representatives on the committee whose position was that PURPA was no longer relevant since we were looking at a DG related policy on a "go forward" basis."

APS believes that the following portion of the first sentence of paragraph 3 of subsection 3.4.2, Application Process, should be deleted: "except where the UDC has objections based on a need to be flexible in each case." Therefore, the first sentence should read as follows: "The SCP Report discussed a need for timeframes." To further clarify an area that that has been subject to much debate, APS proposes to add the following language after the first sentence in this paragraph: Some members of the SCP Committee feel that the process needs to be interactive and iterative.

Subsection 4.1 of the Comments Submitted Regarding Process and Committee Reports discusses the need for a visible disconnect switch. APS proposes to add the following language to the first sentence of this subsection (APS proposed language is underlined) to make sure we are discussing a visible open switch: All parties agree that an accessible, lockable, and visible open disconnect switch to isolate the DG from the grid is an essential part of safe operation of DG on the UDC's distribution system. In addition, APS recommends that the following sentence be deleted from this subsection of the final report because it is one sided: "Some parties have requested that the disconnect use electronic verification rather than physical verification." If this sentence is to remain in the final report, APS would like to draft a response as to why electronic verification will not work.

Attached for your review is a file entitled "DGIRPT6.DOC" with the APS recommended changes included. Typographical, grammatical, and\or minor changes included in the attached file have not been discussed in this letter. If you have any questions about the above comments or attached file, please call me at (602) 250-2474.

Sincerely,

Stephen Bischoff
Arizona Public Service Company

FROM: Steve Schmollinger, Tucson Electric Power Company
TO: Jerry Smith, Arizona Corporation Commission
DATE: 3/8/00 12:08pm
RE: Comments on Advisory Committee Draft Final Report

Jerry,

We have reviewed some of the comments made by the City of Tucson. Linda has done a good job at clarifying some of the issues. However, we feel a word change she made on page 18 in Section 3.4.3 requires further clarification. Here's how the paragraph in question now reads with Linda's change:

"All three committees discussed the issue of real time flow analysis. This topic is also embedded contextually in the topic of mapping the system. UDCs are concerned with the cost of such analysis and the benefits to them of such a Geographic Information System (GIS) based system. Access to real time information is necessary to make informed UDC and consumer decisions and avoid areas of constraint or design projects for optimal impact." [underline added to pinpoint the change]

We agree that access to relevant information may be necessary to make informed decisions. However, some information may be either a) unnecessary and/or b) confidential or proprietary. As you recall, TEP raised this issue a couple meetings ago. For example, if a feeder serves a single large commercial/industrial customer, real-time flow info may reveal that customer's usage patterns. Such customers tend to consider electric usage info as proprietary, since it may give competitors valuable insights. Bottom line for the Advisory Committee report: although the parties identified this issue as important, neither resolution nor consensus has been reached. Also, it really wasn't discussed all that much, and may just require more time to iron out the details, etc.

thanx!
--Steve Schmollinger
Tucson Electric Power

Comments on the Workgroup Final Report for the
Arizona Corporation Commission
Distributed Generation and Interconnection Investigation
Docket No. E-00000A-99-0431

Presented by Honeywell Power Systems, Inc.

March 13, 2000

Honeywell Power Systems, Inc. applauds the work completed by the Arizona workgroup on distributed generation and looks forward to assisting in the implementation of rules for full and open access to the distribution system. Honeywell recognizes that advisory committee work can be arduous and appreciates the working hours and devotion of each committee member in making this report as benign as possible. Honeywell appreciates the opportunity to provide comments on the workgroup's report and contemplates its participation in upcoming workshops. The comments which follow are organized according to the outline provided in the report and are provided in cooperative endeavor..

Section 3.1.1 Tariff Issues

Honeywell endorses the committee's recommendation to initiate a tariffs and rates workshop to address issues relating to specific tariffs envisioned as well as items that were not included in the scope of the committee's work.

Section 3.1.2 Value and cost impacts of DG to the system

Honeywell is concerned about the valuation process for costs and benefits to the system and respectfully requests that it participate fully, along with the commission staff, in incorporating a balanced approach to the UDC's as well as the ESP's; DG manufacturers, and their customers. In the event that no consensus is reached in the Tariffs and Rates Workshop, Honeywell wishes to provide testimony in a bifurcated docket, if necessary, so that the Commission can be fully informed while implementing these rules. Furthermore, the Commission and its staff can look at California as one model to follow. Moreover, the Texas Commission and its experience should provide some insight with these issues. Honeywell is cognizant that this approach is perhaps broader than originally anticipated by the Commission and its staff; however, these matters have impacts which could ultimately make DG uneconomic.

3.3 Conflicting and Divergent Committee Issues; and 3.4 Areas Lacking Consensus

Honeywell wishes to participate in the debate of the issues not agreed upon by the stakeholders and agrees with the report with regard to the specific items relating to ownership and control of DG; distribution planning and operations and the application

process. Honeywell recommends that a strawman approach be implemented and respectfully requests that the process take a look at those jurisdictions such as New York and Texas, where DG rules have been implemented. Standard agreements, siting, and certification processes should be easy and convenient for the customers and end users of DG.

Section 4.2 Metering

While the committee did not contemplate net metering, Honeywell asserts its notion that the rules regarding DG should also incorporate net metering as part of the process. Although Honeywell is not advocating that these issues are tied together, net metering could be an element which affects the customer choice issues. Arizona has established rules for net metering with regard to photovoltaic technologies and could include these matters in future workshops.

Section 4.3 DG Policy

Identification of jurisdictional issues are important for all the players in DG deployment. Honeywell requests that these issues be fully debated in the rulemaking process. Honeywell prepared an outline for the most recent NARUC meetings held in Washington, D.C. and is attaching them to this document as "food for thought" for the Commission and its staff.

Regulatory Barriers to Distributed Generation Technologies

Outline of Issues

National Association of Regulatory Utility Commissioners
Winter Committee Meetings, Washington, DC, March 2000

Prepared for Commissioner David Svanda, Chairman
NARUC Committee on Finance and Technology

by Mark Skowronski, Honeywell Power Systems, Inc., and
Beatriz Rivera and Nat Treadway, Energy Resource Associates, LLC[†]

Introduction

NARUC has long promoted even-handed regulation and the creation of opportunities for innovative technologies. Throughout the past decade, NARUC has encouraged regulatory reforms that reward the use of energy efficiency and renewable resource technologies. In a July 1998 resolution, NARUC urged its members to develop regulations to facilitate interconnection of small-scale, on-site generating facilities. Since that time, two states have adopted interconnection standards[1] and other states are making progress.[2] The 1998 resolution also stated that "NARUC supports further exploration of issues relating to the interconnection of small-scale generators and to the regulation of distribution systems that affect market entry of distributed small-scale generation."

Numerous potential barriers to market entry are recognizable in the electric industry. These potential barriers are organized into five categories in an effort to address NARUC's resolution:

Barrier #1: Utility-Specific Interconnection Requirements

Barrier #2: Burdensome Distribution System Planning and Operating Requirements

Barrier #3: Bundled Distribution Service Tariff Elements and Added Fees and Charges

Barrier #4: Concentrations of Market Power and Lack of Markets

Barrier #5: Jurisdictional Uncertainty

[†] Contact information: M. Skowronski, (310) 512-4178; B. Rivera, (505) 798-6472; N. Treadway (713) 669-9701.
[1] The Public Utility Commission of Texas adopted interconnection regulations on December 1, 1999, and the New York Public Service Commission adopted interconnection regulations on December 31, 1999.
[2] There are interconnection activities ongoing in Arizona, California, New Jersey, and Ohio.

This paper briefly describes the market entry barriers. In several sections, the "best practices" of regulatory commissions are identified in italics.

Background

Distributed generation (DG) technologies are small-scale electric generating units located close to a customer's point of usage. DG is typically located on an industrial site or inside a building. DG technologies operate in a variety of modes, with most existing DG "standing by" as backup at customer facilities. DG has a long and successful history of service to customers who require a highly-reliable source of power, and are willing to pay a premium for service that exceeds the reliability provided by traditional electric utilities. These backup generating units are generally not synchronously connected to the distribution system; however, recent improvements in the efficiency and flexibility of DG technologies and technical interfaces have increased interest in interconnection and parallel operation. Once interconnected, DG can operate in any generating mode: as a peak shaving device, to meet a customer's base load or follow the load, or controlled and dispatched by someone other than the customer.

> *DG has a long and successful history of service to customers who require a highly-reliable source of power, and are willing to pay a premium for service that exceeds the reliability provided by traditional electric utilities.*

Rapid adoption of distributed generation technologies is in the public interest. DG provides the following benefits:

- new technologies provide greater customer choice;
- on-site generation improves customer value through control of costs and enhanced power quality and reliability;
- distributed generation technologies may enhance the efficiency, reliability, and operational benefits of the distribution system;
- access to distributed generation technologies can increase competition by reducing the market power of traditional energy providers, particularly in transmission- and distribution-constrained areas; and
- distributed generation can provide environmental benefits, particularly in combined heat and power applications.

Interest in DG technologies is increasing in response to the following five trends:

(1) Electric demand is increasing as a result of national economic expansion.

(2) Distributed generation technologies such as gas turbines and fuel cells are becoming available at higher levels of efficiency, in smaller sizes, and at lower cost.

(3) Electric industry restructuring has the potential to provide full and open access to essential network facilities thereby increasing market opportunities for distributed generation technologies.

(4) Advances in communications, metering, and control devices are making the electric system more flexible and increasing the opportunities to deploy small-scale technologies more economically.

(5) Customers are demanding increased reliability and power quality.

Barrier #1: Utility-Specific Interconnection Requirements

A customer who is investigating on-site generation must contact the local distribution utility to determine what steps are necessary to connect the technology to the distribution wires. Past experience with another utility is often useless because each utility has developed a unique process for the interconnection of qualifying facilities (QFs). Certain distribution utilities state: "You cannot connect", because these utilities lack procedures for the interconnection of DG facilities that are not QFs.

Statewide technical safety and reliability requirements, application procedures, forms, standard agreements, and related testing and certification requirements could reduce the transaction costs for customers interested in pursuing DG. If these processes and requirements were uniform across the country, a "transaction cost" barrier would be reduced, and the economic benefit would be significant.

Application Process

A standard application form and process will reduce administrative costs for the customer and the utility. The application process sets forth the data that are required to initiate a review, and addresses the scope and timing of any studies that may be required. While each electric utility may prefer to treat each DG application as unique, this approach is time consuming and fraught with inconsistencies. Regulatory commissions have a role to play in adopting a standard application process, including the timeline for utility response to the application at various stages.

New York and Texas have adopted standard forms and an application process for DG. Texas is developing a "DG Interconnection Manual" to simplify the process.

Standard Technical Interface Requirements[3]

Standard technical requirements will insure system safety and reliability. These requirements must be applied fairly and consistently. Interconnection devices must meet minimum standards with regard to performance, operation, testing, safety considerations, and maintenance of the interconnection. The Institute of Electrical and Electronics Engineers, Inc. (IEEE) has created Working Group 1547 to address "Standard for Distributed Resources Interconnected with Electric Power Systems." The standard is scheduled to be adopted in mid-2001 and could replace the technical requirements adopted by the states. At a minimum, state commissions could begin an inquiry that will lead to adoption of the national standards.

Technical requirements have been adopted in Texas and New York.

> *Regulatory commissions have a role to play in adopting a standard application process, including the timeline for utility response to the application at various stages.*

Contractual Issues

Most electric utilities require that customers with generating units enter into a special agreement that sets forth the rights and responsibilities of the customer and the utility. For small DG customers, this may be a very costly process relative to the total project cost. A standard contract can reduce the time necessary for the utility and the customer to sign an agreement.

Studies and Type Testing

A preliminary review of the application can establish the need for additional studies, and any requirements for on-site testing and periodic compliance review. Additional studies may not be needed once the utilities gain experience with particular types and sizes of DG. Small factory-built generating units could be "type tested" and "certified" to assure consistency. Manufacture of standard DG units will lower the total cost of the product, and could ensure that uniform, factory-tested DG packages perform as expected.

New York has made the most progress in establishing standards for type testing of DG.

Local Siting and Permitting

Because DG is new to many local officials, it is necessary to conduct outreach to make these officials aware of the role of DG in the competitive electric system. Conversely, DG customers could benefit from a list of typical local regulations that they may encounter,

[3] The word "standards" is often reserved in this context for the products of nationally-recognized standards organizations. The words "requirements" and "guidelines" are used to refer to the state commissions' regulations.

including siting and environmental permitting requirements. Standardization of the requirements for siting and environmental permitting of DG will reduce the cost and uncertainty associated with compliance.

Barrier #2: Burdensome Distribution System Planning and Operating Requirements

Burdensome distribution system operating and planning requirements may result in the unfair treatment of non-utility distributed generation technologies. Distribution utilities must ensure the safe and reliable operation of the wires utility, but regulators must recognize that DG places competitive pressure on the wires function; therefore, distribution utilities may resist DG.

Distribution Planning

Electric utilities are interested in forecasting the impact of DG on future load requirements. Increased emphasis on distribution planning by utilities could impose significant reporting requirements on DG customers. The need to incorporate the impact of DG into forecasts and plans is real, and there are many ways to address utility concerns to reduce the burden on DG customers. The distribution utility is concerned that all small generating units could be tripped off (due to an under-voltage situation), and that the distribution system must be sized to serve the total customer load. Deferral of system T&D upgrades may be feasible if DG is appropriately sited and dispatched. A key factor that is often ignored in the distribution system planning debate is that most DG will function as a demand-side management resource to reduce customer impact on the distribution system.

Distribution Operations

The most important operational concern with DG is the threat to worker safety of an unintentional "islanding" occurs. The distribution utility may be interested in the dispatch and control of each DG unit, or in the control of DG customer loads if a DG unit fails to perform as scheduled. Distribution utilities are also concerned with reactive power and frequency control on circuits that have DG. The need to address the impact of DG on distribution operations is real; however, it may not be necessary to schedule and control each DG to address the distribution utility's and the independent system operator's (ISO) concerns.

California is investigating distribution system planning and operations. A report will be considered as part of a DG rulemaking proceeding.

Metering, Communications, and Control

There is general agreement that the development of standards and protocols at customer interfaces will facilitate the operation of a network. Standards and protocols for communications and control systems for DG need to be developed if central dispatch is desired. There is some disagreement over whether communications and control devices will

be required for all distributed generation technologies, or whether this is an option that the customer may select. Some ISOs and utilities are calling for the scheduling of each DG unit, regardless of size or intended operational schedule. Those matters are closely related to Ownership & Control of DG (Barrier #4) and the Role and Authority of the ISO (Barrier #5).

Barrier #3: Bundled Distribution Service Tariff Elements and Added Fees and Charges

Bundled distribution service tariff elements and fees and charges may present economic barriers to distributed generation technologies. Traditional rate design relies on average-embedded cost-of-service pricing. There is a need to more fully unbundle tariff elements and to eliminate the tying of services to increase customer choice.

A decision to maintain the status quo on rate designs will favor large, central power plants that will benefit from spreading transmission and distribution costs to all customers. DG customers may not need all of these services, and they should not be required to pay for transmission and distribution services that they do not use.

> *A key factor that is often ignored in the distribution system planning debate is that most DG will function as a demand-side management resource to reduce customer impact on the distribution system.*

Fees and Charges for Interconnection

There is general agreement that processing DG applications, conducting system impact studies for DG, and upgrading the distribution system will cost money. The issue of "Who Pays?" must be considered. One perspective holds that the incremental costs must all be born by the DG customer who is causing these costs. Another perspective is that all customers impose costs on the distribution system, and the traditional role of the utility has been to provide the services and to request cost recovery in a general rate case. The changing role of the distribution utility may require a reexamination of the traditional cost allocation formulas. If DG customers are required to pay these incremental charges, it may be appropriate to ask whether the customer can hire a third party to perform the work.

Stranded Cost Charges

In several jurisdictions, customers have been required to pay utilities the above-market costs of nuclear generating units. The competitive transition charge secures and accelerates the utility's recovery of these investments. Exit fees are payments for electric services that a customer no longer plans to buy from the utility, but for which the customer is held responsible. Some parties are calling for exit fees to cover distribution service as usage is

reduced. Stranded cost charges present an economic barrier to any customer seeking lower-cost alternatives.

In Texas and Ohio certain DG customers are exempted from paying stranded cost charges.

Standby Rates

Customers who rely on on-site power but would like power for emergency uses and for scheduled DG maintenance must acquire standby distribution service from a utility. Some utilities require that customers take standby service. Utility costing for standby service is based on cost-causation assumptions that result in high facility or demand charges. These charges present barriers to DG projects. An alternative costing methodology could place emphasis on the real-time cost of distribution service when it is called for. There is a need for additional load research to substantiate the design of standby tariffs for small-scale generating units.

Distribution Tariffs

As generation costs decrease, the portion of the total bill that will be wires-related will increase. Distribution service can be unbundled to its most elemental level to insure that customers are provided with the choices that they prefer. Electric utilities prefer bundled "plain vanilla" distribution service, rather than unbundled distribution service, so that the cost of service is spread to all customers, regardless of whether they want a particular service. Customer choice would increase if distribution utilities offered time-of-use and interruptible distribution service tariffs. Increasing the regulated options available to customers will increase the differentiation of service, and will allow the market to provide services to customers. For example, increased reliability has been successfully and economically provided by the market for years. Full unbundling of distribution service is consistent with increasing customer choice.

Barrier #4: Concentrations of Market Power and Lack of Markets

Concentrations of market power may restrict the development of markets for distributed generation technologies.

Valuation and Proper Allocation of DG Benefits

Though most DG applications are likely to be self-service, it is appropriate for DG owners to reap the benefit of ancillary services that they provide to the grid. DG provides value to the distribution system -- even without exporting power from the customer's facility -- and that value is not compensated.[4] DG can enhance the reliability of service, reduce transmission and distribution losses, provide spinning and non-spinning reserves, defer

[4] An example of customers who provide value to the grid without power export is curtailable customers. These customers can instantaneously reduce load when called upon by the system operator. Compensation has traditionally come through an interruptible service tariff.

transmission and distribution upgrades, provide voltage support, enhance power quality, and reduce emissions.

Most proponents of DG prefer market access so that the market can value DG. Where access to markets is denied, regulatory intervention is necessary to require the distribution utility (or ISO) to purchase or compensate ancillary services. Markets can be created periodically through the issuance of a request for proposals (RFP), or continuously through pricing signals contained in the distribution service tariffs. Net metering is one form of pricing (available in 30 states) that has encouraged renewable DG. Other economic incentives would appropriately compensate all DG technologies for the value provided to the system.

Customer Access to Services

Access to markets for the purchase of ancillary services is important to the DG customer. Where services are available in the marketplace, the regulatory authority can leave the market alone to provide the services that customers prefer. Where services are only available through one seller (the distribution utility or the power exchange, for example), regulators should make sure that the services are available on a nondiscriminatory basis. DG customers will benefit if regulated products and services are unbundled to the greatest possible extent, thus allowing the customer to choose products that are differentiated with respect to time (time-of-use pricing), location (geographically-based incentives), and quality/reliability (interruptible/curtailable service options).

> *Increasing the regulated options available to customers will increase the differentiation of service, and will allow the market to provide services to customers.*

Ownership & Control of DG

The location, ownership, and control of DG may affect utility revenues and can affect competition and customer choice. Utility ownership of DG may create a conflict of interest and make it difficult for the utility to treat the DG customer fairly. The ownership and control of DG is related to the issue of valuation and allocation of the benefits of DG. If the DG customer is restricted to one buyer (the utility as monopsonist), then utility ownership of DG may foreclose opportunities for sales of power and ancillary services to the grid. In lieu of owning DG, distribution utilities (or a distribution ISO) can achieve a measure of economic and contractual control over DG by creating a market for the value provided by DG. Issuance of a request for proposals (RFP) for specific system resource functionality would allow alternative resource providers to compete against one another.

Independent Distribution System Operator

The operation of the distribution system is presently a distribution utility function. If a distribution utility can exercise market power to maintain barriers for DG customers, then an alternative regime would be appropriate. An independent distribution system operator could make objective decisions regarding DG unit control and dispatch.

Retail Access and Distribution Wheeling

Despite the move toward retail access in many states during the past five years, the issue of retail wheeling for distributed generation has not been settled. In jurisdictions that have established a power pool and exchange, it is unclear whether DG would need to sell into the pool in order to sell power to a "next-door" retail customer (that is, a customer on the same distribution feeder). In other words, the authority of DG customers to use the distribution wires has not been firmly established. Certain DG customers may be interested in selling excess power to the grid, but utilities are reluctant to offer that type of distribution service. Unbundled retail wheeling service must be developed in order to create a market for the local sale of power.

Barrier #5: Jurisdictional Uncertainty

Ambiguous jurisdictional authority may hinder the business climate necessary for private investment in distributed generation technologies.

FERC Jurisdiction

There is uncertainty regarding the jurisdiction of Federal Energy Regulatory Commission (FERC), the jurisdiction of state commissions, and the role and authority of local distribution utilities. DG customers who sell to wholesale market are under FERC jurisdiction; however, the interconnection of DG to the distribution system appears to be a state jurisdictional matter. Unclear jurisdiction hinders business investment.

FERC jurisdiction is a matter for testimony and an evidentiary hearing in California.

The Role and Authority of the ISO

ISOs have authority to ensure that transmission reliability is maintained and that competitive wholesale markets are fostered. In states that are pursuing retail competition, the role of the ISO could be extended to the operation of the distribution system. In at least one jurisdiction, the ISO is attempting to meter and control each DG technology. Alternatively, new institutions may be necessary to serve the function of a distribution ISO (Barrier #4). A significant number of structural issues remain relating to the organization of the electric utility industry at the distribution and retail level. The dividing line between the ISO and the distribution utility is not always clear, and this uncertainty affects customers who are considering investments in DG.

Role of the Wires Company in the Future

The role of the wires utility may be examined to determine whether there is a natural wires monopoly. DG is a unique component of energy service, and it can substitute for generation, transmission, and distribution. The role of the distribution utility should be open to debate because continuation of past regulation treats consuming customers (end users) in one way, and producing customers (generators) in another. A wires company that is in the "connection business" could treat all customers in a similar manner, regardless of whether they are net producers or consumers of electricity. A new business model is necessary to ensure that utilities have strong incentives to treat all customers fairly while maintaining profitability.

> *Despite the move toward retail access in many states during the past five years, the issue of retail wheeling for distributed generation has not been settled.*

Electric utilities have been allowed to provide more and more competitive services during the past twenty years. Uncertainty could be reduced if state commissions would adopt policy positions that are consistent with the trends toward more competition. Distribution utilities should be restricted to providing natural monopoly services: services that are not currently available or could not be provided by the marketplace.

Natural Gas Delivery

As the installation of DG technologies becomes more prevalent, the adequacy of the natural gas infrastructure may be confronted. In certain locations the gas pressure may be inadequate to support widespread DG operation, thus requiring a reexamination of the distribution pipeline capacity. There may be a need for joint planning among the affected industries, but there is an increasing resistance to state-administered planning approaches. Uncertainty regarding pipeline capacity may affect the business climate for DG in several locations.